COUPLER HAVING A SOLID LOCKING PIN DEVICE

The present invention is a divisional application of U.S. Patent Application No. 10/124,703, filed on 12 April 2002, allowed.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a coupler, and more particularly to a coupler having a solid locking pin device.

2. Description of the Prior Art

Typical couplers comprise one or more handles or hand grips or arms or levers pivotally or rotatably secured thereto with one or more rivets or locking pins. Normally, the locking pins include a head formed or provided on one end thereof, and include the other end having a solid structure and to be stricken with a hammer device or to be forged with a rivet device, and thus to be deformed in order to engage with the coupler, and thus to rotatably or pivotally secure the locking pin to the coupler.

However, the deformed end of the locking pin normally may not be completely or suitably deformed and may not be solidly secured to the coupler, such that the deformed end of the locking pin may be easily become loose after use.

For solidly securing locking pins to couplers or the like, one or more clamping rings or retaining rings are required to be attached onto the locking pins, and engaged with the couplers, for retaining the locking pins to the couplers.

For example, U.S. Patent No. 5,769,470 to Toyomura, U.S. Patent No. 5,950,295 to Worden et al., and U.S. Patent No. 6,092,958 to Gale disclose three of the typical couplers each

including one or more clamping rings or retaining rings clamped onto the locking pins, and engaged with the couplers, for securing the locking pins to the couplers. However, the clamping rings or retaining rings may have a good chance to be disengaged from the locking pins, such that the locking pins may have a good chance to be disengaged from the couplers.

U.S. Patent No. 3,209,446 to Nicholas discloses another typical coupler having a locking pin to be engaged into and secured to an object by expanding or forging one end of the locking pin outwardly to engage with the object, without clamping rings or retaining rings. However, the locking pins are only partially expanded outwardly relative to the object, and may be deformed when forces are applied onto the object against the locking pins.

U.S. Patent No. 5,077,918 to Garman discloses a further typical coupler having two bolts secured onto an object and to be secured together with a threaded fastener. The two bolts are simply secured onto the object with the fastener only, and thus may also have a good chance to be disengaged from the object.

The present invention has arisen to mitigate and/or obviate the afore-described disadvantages of the conventional couplers.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a coupler including a locking pin device having a solid securing structure for solidly securing the locking pin device onto the coupler.

In accordance with one aspect of the invention, there is provided a coupler comprising a coupler body including two ears

extended therefrom, and having a channel formed between the ears, the ears each including an orifice formed therein, a lever including a first end received in the channel of the body, and having an aperture formed therein for aligning with the orifices of the ears, and an integral one-piece locking pin engaged through the orifices of the ears and engaged through the aperture of the lever, to pivotally secure the lever to the ears, the locking pin including a first end having a head provided thereon for engaging with a first ear of the ears, and the locking pin including a second end having an opening formed therein and defined by a peripheral wall. The peripheral wall of the locking pin is arranged to be expanded and deformed radially outward to engage with a second ear of the ears, to solidly secure the locking pin to the ears, and thus to stably and rotatably secure the lever to the coupler body.

The head of the locking pin includes an inner portion having a flat peripheral surface formed thereon to flatly engage with the first ear. The head of the locking pin includes an outer portion having a convex bulge extended outward therefrom, opposite to the inner flat peripheral surface thereof, to increase a strength of the head of the locking pin.

Further objectives and advantages of the present invention will become apparent from a careful reading of the detailed description provided hereinbelow, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a coupler in accordance with the present invention;

FIG. 2 is an enlarged partial perspective view of the coupler;

FIG. 3 is an exploded view of the coupler;

FIG. 4 is an enlarged perspective view illustrating a locking pin device of the coupler, in which a portion of the locking pin device is cut off therefrom; and

FIG. 5 is a partial cross sectional view taken along lines 5-5 of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and initially to FIGS. 1-4, a coupler in accordance with the present invention comprises a coupler body 20 including one or more pairs of ears 21, 22 provided thereon or extended therefrom. Each pair of the ears 21, 22 includes an orifice 23 formed therein, and a channel 24 formed or defined between the pair of ears 21, 22.

A handle or lever 30 includes one end engaged in the channel 24 of the coupler body 20 and having an aperture 31 formed therein for aligning with the orifices 23 of the ears 21, 22. A locking pin 10 is engaged through the orifices 23 of the ears 21, 22 and the aperture 31 of the lever 30 for pivotally or rotatably securing the lever 30 to the ears 21, 22 of the coupler body 20.

The locking pin 10 includes a solid or integral structure having a head 11 formed or provided on one end thereof. The head 11 includes a convex bulge 12 extended outwardly from the outer portion thereof for increasing the strength of the head 11, and includes a flat inner peripheral surface 13 for flatly or solidly engaging with one of the ears 21, 22, best shown in FIG. 5.

The locking pin 10 includes a hollow structure having a bore

14 formed therein, or having the bore 14 formed in the other end thereof, and defined by a peripheral wall 15. The peripheral wall 15 is arranged to be suitably expanded or hammered or forged or deformed radially outward, best shown in FIGS. 1, 2, and 5, for engaging onto the ears 21, 22 of the coupler body 20, and for solidly securing the locking pin 10 to the ears 21, 22, and thus for pivotally or rotatably securing the lever 30 to the ears 21, 22 of the coupler body 20.

It is to be noted that the locking pin 10 includes a solid or integral structure formed by one-integral member, and the peripheral wall 15 may be expanded or hammered or deformed radially outward to engage onto the ears 21, 22 and to solidly secure the locking pin 10 to the ears 21, 22, and thus for pivotally or rotatably securing the lever 30 to the ears 21, 22 of the coupler body 20.

Accordingly, the coupler in accordance with the present invention includes a solid securing structure for solidly securing the locking pin device onto the coupler.

Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made by way of example only and that numerous changes in the detailed construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.